

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 1885-71 (1993): Electrotechnical Vocabulary, Part 71: Generation, transmission and distribution of electricity - Substations [ETD 1: Basic Electrotechnical Standards]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



IS 1885 (Part 71) : 1993

IEC Pub 50 (605) (1983)

भारतीय मानक

(Reaffirmed 2004)

विद्युत तकनीकी शब्दावली

भाग 71 विद्युत उत्पादन, प्रेषण और वितरण — उपघर

Indian Standard

ELECTROTECHNICAL VOCABULARY

**PART 71 GENERATION, TRANSMISSION AND DISTRIBUTION OF
ELECTRICITY — SUBSTATIONS**

UDC 621.311 : 001.4

© BIS 1993

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

May 1993

Price Group 6

CONTENTS

<i>Section</i>						<i>Page</i>
605-01 Types of substations — Substation layouts	...	...	...	...	...	1
605-02 Primary plant of substations	...	...	...	...	...	2
605-03 Secondary arrangements of substations	...	...	...	...	...	9
Index	...	...	...	...	...	10

NATIONAL FOREWORD

This Indian Standard (Part 71) which is identical with IEC Pub 50 (605) (1983) 'International electrotechnical vocabulary — Chapter 605 : Generation, transmission and distribution of electricity — Substations', issued by International Electrotechnical Commission (IEC), was adopted by the Bureau of Indian Standards on the recommendation of the Basic Electrotechnical Standards Sectional Committee and approval of the Electrotechnical Division Council.

Only the English text given in the IEC publication has been retained while adopting as Indian Standard, and as such the page numbers given here are not the same as in IEC Publication.

Indian Standard
ELECTROTECHNICAL VOCABULARY
PART 71 GENERATION, TRANSMISSION AND DISTRIBUTION OF
ELECTRICITY — SUBSTATIONS

SECTION 605-01 — TYPES OF SUBSTATIONS — SUBSTATION LAYOUTS

605-01-01

substation (of a power system)

The part of a power system, concentrated in a given place, including mainly the terminations of transmission or distribution lines switchgear and housing and which may also include transformers. It generally includes facilities necessary for system security and control (e.g. the protective devices).

Note.— According to the nature of the system within which the substation is included, a prefix may qualify it.

Examples: transmission substation (of a transmission system), distribution substation, 400 kV substation, 20 kV substation.

605-01-02

switching substation

A substation which includes switchgear and usually busbars, but no power transformers.

605-01-03

transformer substation

A substation containing power transformers interconnecting two or more networks of different voltages.

605-01-04

step-up substation

A transformer substation in which the outgoing power from the transformers is at a higher voltage than the incoming power.

605-01-05

step-down substation

A transformer substation in which the outgoing power from the transformers is at a lower voltage than the incoming power.

605-01-06

traction substation

A substation, the main function of which is to supply a traction system.

605-01-07

converter substation

A substation including converters and the main function of which is to convert alternating current into direct current or vice versa.

605-01-08

frequency converter substation

A substation in which an a.c. current at a given frequency is converted into an a.c. current at another frequency.

605-01-09

manned substation

A substation which is locally operated by personnel working within the substation.

605-01-10

unmanned substation

A substation which is operated by personnel who are not stationed at the substation.

605-01-11

permanently manned substation

A substation which is continuously controlled by personnel who are stationed at the substation.

605-01-12

attended substation

A substation which is operated by personnel during the normal working hours and otherwise as necessary.

605-01-13

remotely controlled substation

An unmanned substation which is controlled by means of telecontrol devices.

605-01-14

master substation

A manned substation from which remotely controlled substations are controlled.

605-01-15

satellite substation

One of the remotely controlled substations, controlled by a master substation.

605-01-16

single busbar substation

A substation in which the lines and transformers are connected to one busbar only.

605-01-17

double busbar substation

A substation in which the lines and transformers are connected via two busbars by means of selectors.

605-01-18

triple busbar substation

A substation in which the lines and transformers are connected via three busbars by means of selectors.

605-01-19

ring substation

A single busbar substation in which the busbar is formed as a closed loop with only disconnectors in series within the loop.

605-01-20

mesh substation

A single busbar substation in which the busbar is formed as a closed loop with circuit breakers in series within the loop.

605-01-21

four-switch substation

A mesh substation having a busbar of square configuration with a switch or a circuit-breaker within each side.

605-01-22

three-switch mesh substation with bypass

A mesh substation with usually two feeders and two transformers, the fourth circuit-breaker of the four-switch mesh substation is replaced by a bypass with one or two disconnectors (see Figure 1).

605-01-23

four-switch mesh substation with mesh opening disconnectors

A mesh substation, the busbar of which comprises both circuit breakers and disconnectors (see Figure 2).

605-01-24

two-breaker arrangement

A double busbar substation in which the selectors are circuit-breakers.

605-01-25

one-and-a-half breaker arrangement

A double busbar substation where, for two circuits, three circuit-breakers are connected in series between the two busbars, the circuits being connected on each side of the central circuit-breaker (see Figure 3).

605-01-26

associated phase layout

In a substation, a layout in which the conductors relating to the three phases of the same circuit are located side by side (see Figure 4a).

605-01-27

separated phase layout

In a substation, a layout in which the conductors of different circuits, relating to the same phase, are located side by side (see Figure 4b).

605-01-28

mixed phase layout

In a substation, a layout in which the busbars are arranged as a separated phase layout but the bay circuits are arranged as associated phase layout (see Figure 4c).

SECTION 605-02 — PRIMARY PLANT OF SUBSTATIONS

605-02-01

busbar

A low impedance conductor to which several electric circuits can be separately connected.

605-02-02

busbars (commonly called busbar)

In a substation, the busbar assembly necessary to make a common connection for several circuits.

Example: three busbars for a three-phase system.

605-02-03

main busbar

in a double (or triple) busbar substation, any busbar which is used under normal conditions.

605-02-04

reserve busbar

In a double (or triple) busbar substation, any busbar which is used under abnormal conditions. It is generally less well equipped than a main busbar.

605-02-05

transfer busbar

A back-up busbar to which any circuit can be connected independently of its bay equipment (circuit-breaker, instrument transformer), the control of this circuit

being ensured by another specific bay, available for any circuit.

Note. — This transfer busbar is generally not counted within "double" ("triple") busbar substation (see 605-01-17 and 605-01-18).

605-02-06

switchable busbar

A busbar including a switch (or a circuit-breaker) in series, intended to connect or disconnect two sections of that busbar.

605-02-07

disconnectable busbar

A busbar including disconnector(s) in series intended to connect or disconnect two sections of that busbar, off load.

605-02-08

busbar section

The part of a busbar located between two switching devices (or disconnectors) put in series or between a switching device and the end of the busbar.

605-02-09

bay (of a substation)

The part of a substation within which the switchgear and controlgear relating to a given circuit is contained.

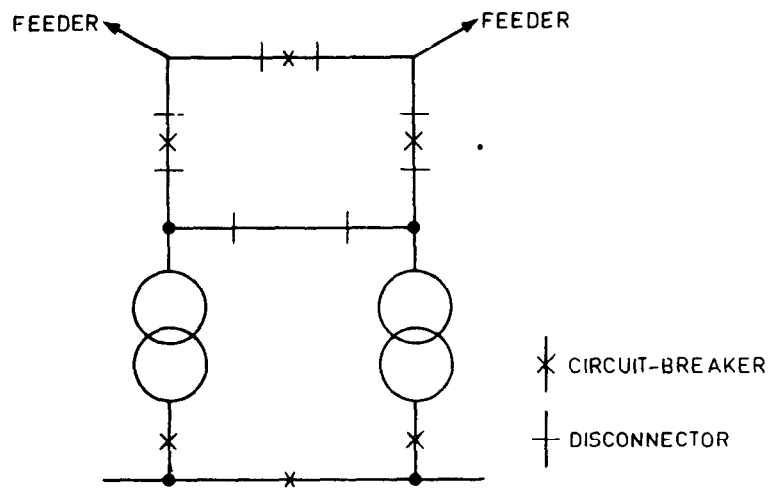


FIG. 1 THREE-SWITCH MESH SUBSTATION WITH BYPASS

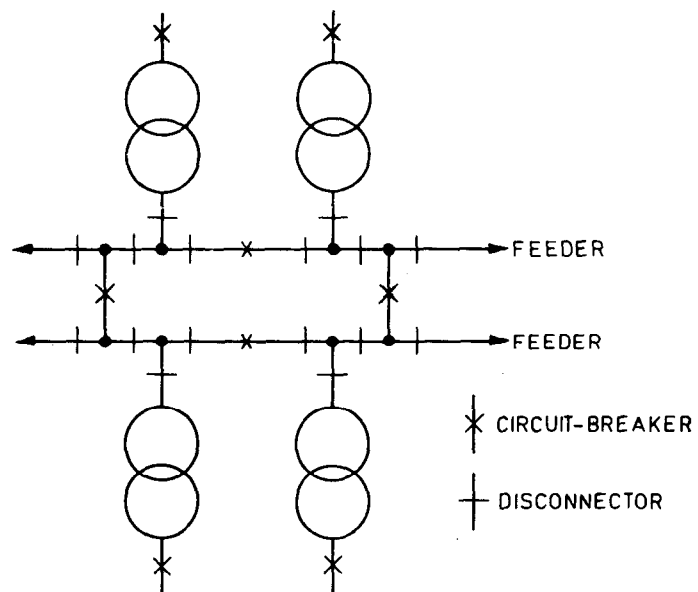


FIG. 2 FOUR-SWITCH MESH SUBSTATION WITH MESH OPENING

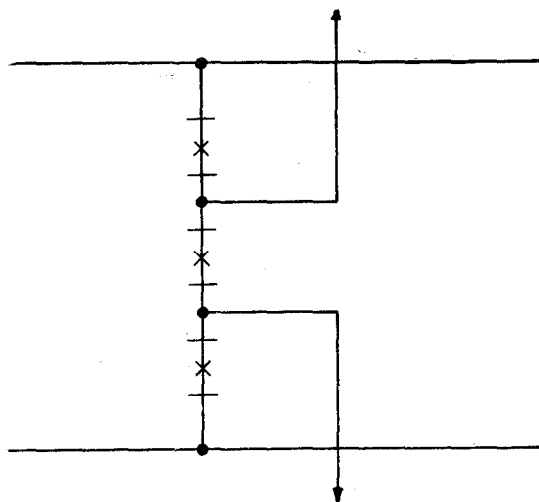


FIG. 3 ONE AND HALF BREAKER ARRANGEMENT

Note— According to the type of circuit, a substation may include: feeder bays, transformer bays, bus coupler bays, etc.

605-02-10

feeder bay

In a substation, the bay relating to a feeder or a link to a transformer, a generator or another substation.

605-02-11[12]

outgoing [incoming] feeder

In a substation a feeder bay which is normally used to transmit power to the system [receive power from the system].

605-02-13

open-type substation

A substation in which the insulation to earth and between phase conductors is mainly provided by air at atmospheric pressure and in which some live parts are not enclosed.

Note — An open-type substation may be indoor or outdoor.

605-02-14

gas insulated metal-enclosed substation

A substation which is made up with only gas insulated metal enclosed switchgear.

605-02-15

indoor substation

A substation sheltered from external weather conditions by being installed within a building.

605-02-16

outdoor substation

A substation which is designed and installed to withstand external weather conditions.

605-02-17

kiosk substation

A compact substation, often prefabricated and used only for distribution purposes.

605-02-18

underground substation

vault substation

A substation which is built to operate underground.

605-02-19

pole-mounted substation

An outdoor distribution substation mounted on one or more poles.

605-02-20

substation structures

The assembly of rigid frameworks either for hanging conductors or for supporting conductors or switchgear and other apparatus.

605-02-21

rigid busbar

A substation busbar which is made up with metallic tubes or bars and which is supported by insulator posts.

Note— The busbar may be in the form of a self supporting bridge construction.

605-02-22

flexible busbar

A substation busbar which is made up with flexible conductors.

605-02-23

phase-to-phase clearance

The minimum distance between live parts of two adjacent phases taking into account all operating conditions.

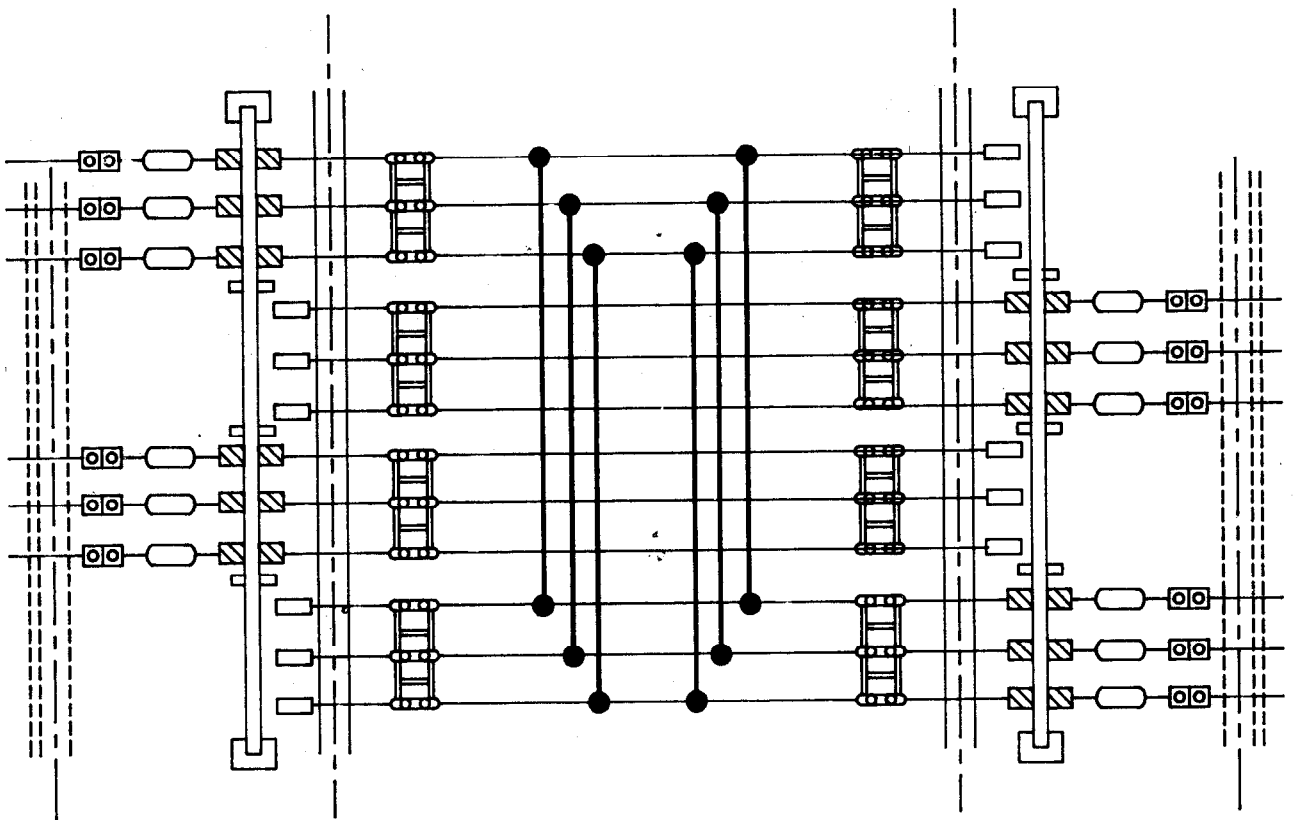
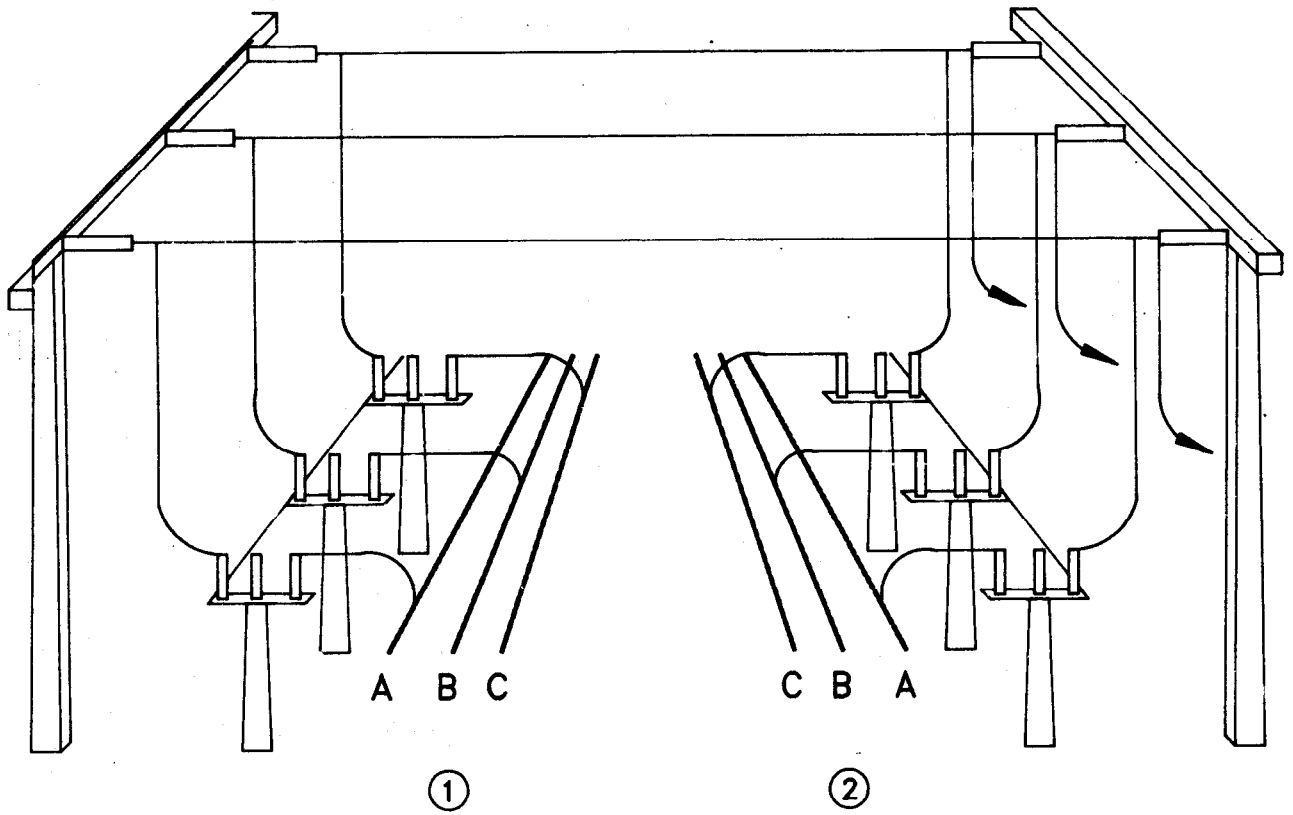


FIG. 4 a ASSOCIATED PHASE LAYOUT

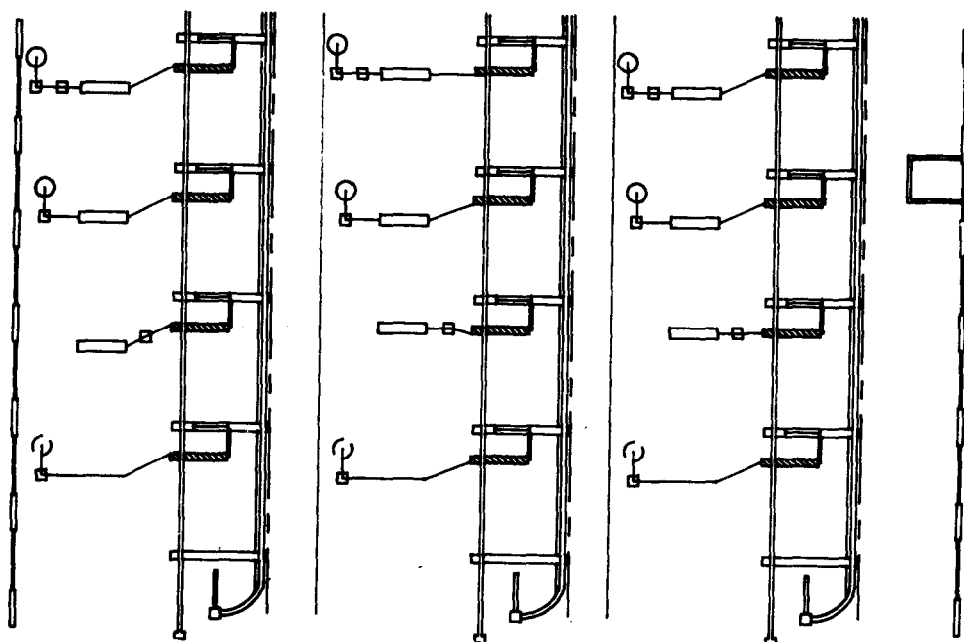
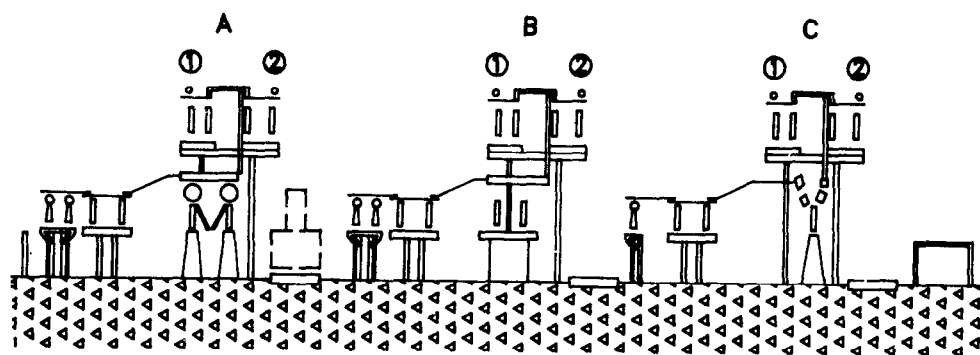


FIG. 4 b SEPARATED PHASE LAYOUT

605-02-24

phase-to-earth clearance

The minimum distance between any live parts and all structures at earth potential.

605-02-25

working clearance

The minimum safe distance to be observed between normally exposed live parts and any person working in a substation.

605-02-26

cable trough (in a substation)

A channel intended to enable secondary, auxiliary and control cables to be laid within a substation.

605-02-27

cable duct (in a substation)

A conduit laid in the ground and intended to enable secondary, auxiliary and control cables to be drawn through within a substation.

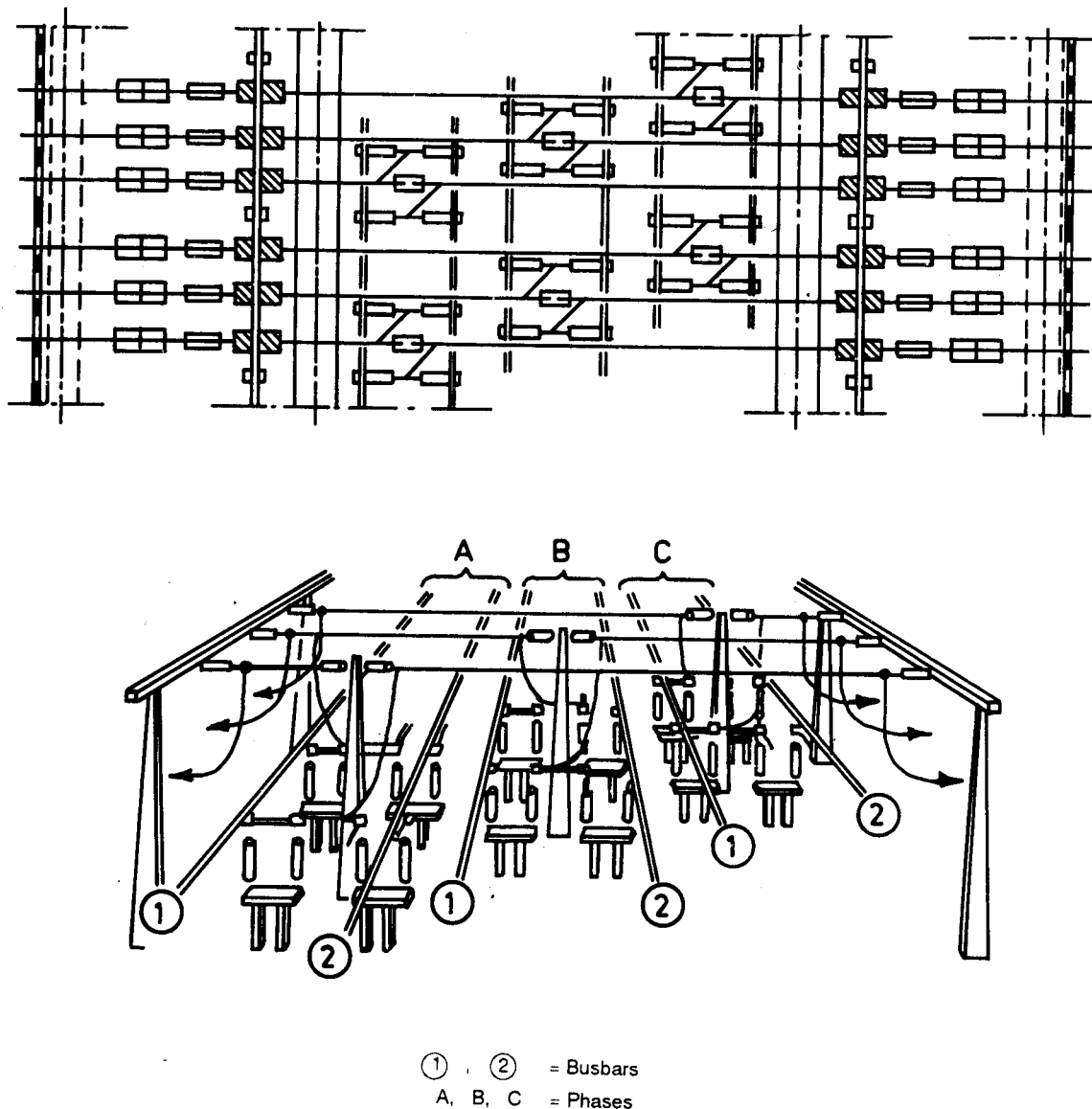


FIG. 4 c MIXED PHASE LAYOUT

605-02-28
cable tunnel

A construction of corridor or tunnel configuration intended to include numerous cables which are arranged on cable racks or shelves.

605-02-29
cable rack

A shelf intended to receive cables which are usually arranged to run side by side.

605-02-30
oil leakage sump

A receptacle which is intended to receive the oil of a transformer or other oil filled equipment in case of leakage.

605-02-31
fire protection wall

In a substation, a wall erected between two items of

equipment usually oil-filled to prevent the spread of fire from one to the other.

605-02-32

acoustic enclosure

An enclosure (partial or total) made of sound absorbing material that surrounds a transformer in order to reduce its emitted noise.

605-02-33

earth circuit connector

A device which is designed to connect together the different parts of an earthing system within a substation. This device sometimes includes a component which is intended to connect the earthing for work.

605-02-34

substation control room

A room of a substation in which are located facilities necessary to monitor and control substation items.

605-02-35

substation telecontrol room

A room of a substation in which is located the equipment necessary to transmit and receive information relating to telecontrol.

605-02-36

substation relay room

A room of a substation in which protection and automatic equipment is located in a centralized arrangement.

605-02-37

substation relay building

substation relay kiosk

A small building or cabinet close to the bay switchgear and controlgear, where protection and automatic equipment relating to this bay is located.

605-02-38

feeder circuit-breaker

In a substation, a circuit-breaker which is located within a feeder bay and through which a feeder can be energized.

605-02-39

transformer circuit-breaker

In a substation, one of the circuit-breakers located on each side of a transformer and which is usually designated by the corresponding voltage level.

605-02-40

bus coupler circuit-breaker

In a substation a circuit-breaker which is located between two busbars and which permits the busbars to be coupled; it may be associated with selectors in case of more than two busbars.

605-02-41

switched busbar circuit-breaker

In a substation a circuit-breaker, connected in series within a busbar, between two busbar sections.

605-02-42

selector switch disconnecter

In a double or triple busbar substation, a disconnecter which is intended to connect a primary circuit (line, transformer, etc.) to one of the busbars.

605-02-43

earthing switch

In a substation, a special disconnecter which is intended to connect phase conductors to earth for safety purposes.

605-02-44

feeder disconnecter

A disconnecter which is located in series at the end of a feeder, within a substation bay, in order to isolate the feeder from the system.

605-02-45

busbar section disconnecter

A disconnecter which is connected in series between two busbar sections, in order to disconnect them from each other.

605-02-46

auxiliary transformer

In a substation, a transformer intended to provide supply to the auxiliary equipment.

SECTION 605-03 — SECONDARY ARRANGEMENTS OF SUBSTATIONS

605-03-01[02]

control board [desk]

A board [desk] on which are fixed control devices which are necessary to control and/or display a substation or a system.

605-03-03

mimic diagram

wall diagram

An arrangement of symbols representing the current

state of switchgear and lines of a substation (network) and which may be updateable and may have control functions.

605-03-04

visual display unit

A unit comprising devices which are necessary to display information required and, possibly to include acknowledgement facility.

605-03-05

discrepancy switch

A switched indicator, with an acknowledgement facility, which shows any discrepancy between the actual and indicated state of the equipment being monitored.

605-03-06

control discrepancy switch

A discrepancy switch incorporating a control function.

605-03-07

wiring (secondary wiring)

All the wires and connections necessary to connect together and to supply all the separate protection, control and monitoring components within a substation.

605-03-08

jumper board

A board consisting of terminals and connecting devices so arranged that they can be cross-connected in any desired manner.

605-03-09

dedicated low-voltage wiring

The part of a substation secondary devices and wiring which is essentially associated with a given primary circuit (a line, a transformer, etc).

605-03-10

inter-circuit wiring

The part of a substation wiring which is intended to transmit any information between different circuits

605-03-11

auxiliary switchboard

A panel (or a cubicle) on which are fixed the devices necessary to control, to protect and to distribute auxiliary a.c. and d.c. supplies within a substation.

605-03-12

non-essential auxiliary circuits

Those a.c. auxiliary circuits within a substation which are not supplied during a loss of system supply.

605-03-13

essential auxiliary circuits

Those a.c. auxiliary circuits within a substation which are supplied even during a loss of system supply, for example from a stand-by generator.

605-03-14

common battery

Within a substation, a battery which is intended to supply the control, monitoring and protection equipment relating to all circuits.

605-03-15

dedicated battery

Within a substation, one of the batteries which is intended to supply the control, monitoring and protection equipment relating to one or a few circuits.

INDEX

A		J	
acoustic enclosure	605-02-32	jumper board	605-03-08
associated phase layout	605-01-26	K	
attended substation	605-01-12	kiosk substation	605-02-17
auxiliary switchboard	605-03-11	M	
auxiliary transformer	605-02-46	main busbar	605-02-03
B		manned substation	605-01-09
bay (of a substation)	605-02-09	master substation	605-01-14
busbar	605-02-01	mesh substation	605-01-20
busbars	605-02-02	mimic diagram	605-03-03
busbar section	605-02-08	mixed phase layout	605-01-28
busbar section disconnecter	605-02-45	N	
bus coupler circuit-breaker	605-02-40	non-essential auxiliary circuits	605-03-12
C		O	
cable duct (in a substation)	605-02-27	oil leakage sump	605-02-30
cable rack	605-02-29	one-and-a-half breaker arrangement	605-01-25
cable trough (in a substation)	605-02-26	open-type substation	605-02-13
cable tunnel	605-02-28	outdoor substation	605-02-16
common battery	605-03-14	outgoing feeder	605-02-11
control board	605-03-01	P	
control desk	605-03-02	permanently manned substation	605-01-11
control discrepancy switch	605-03-06	phase-to-earth clearance	605-02-24
converter substation	605-01-07	phase-to-phase clearance	605-02-23
D		pole-mounted substation	605-02-19
dedicated battery	605-03-15	R	
dedicated low-voltage wiring	605-03-09	remotely controlled substation	605-01-13
disconnectable busbar	605-02-07	reserve busbar	605-02-04
discrepancy switch	605-03-05	rigid busbar	605-02-21
double busbar substation	605-01-17	ring substation	605-01-19
E		S	
earth circuit connector	605-02-33	satellite substation	605-01-15
earthing switch	605-02-43	selector switch disconnecter	605-02-42
essential auxiliary circuits	605-03-13	separated phase layout	605-01-27
F		single busbar substation	605-01-16
feeder bay	605-02-10	step-down substation	605-01-05
feeder circuit-breaker	605-02-38	step-up substation	605-01-04
feeder disconnecter	605-02-44	substation (of a power system)	605-01-01
fire protection wall	605-02-31	substation control room	605-02-34
flexible busbar	605-02-22	substation relay building	605-02-37
four-switch mesh substation	605-01-21	substation relay kiosk	605-02-37
four-switch mesh substation with mesh opening disconnectors	605-01-23	substation relay room	605-02-36
frequency converter substation	605-01-08	substation structures	605-02-20
G		substation telecontrol room	605-02-35
gas insulated metal enclosed substation	605-02-14	switchable busbar	605-02-06
I		switched busbar circuit-breaker	605-02-41
incoming feeder	605-02-12	switching substation	605-01-02
indoor substation	605-02-15	T	
inter-circuit wiring	605-03-10	three-switch mesh substation with bypass	605-01-22
		traction substation	605-01-06

transfer busbar	605-02-05			V
transformer circuit-breaker	605-02-39			
transformer substation	605-01-03	vault substation		605-02-18
triple busbar substation	605-01-18	visual display unit		605-03-04
two-breaker arrangement	605-01-24			W
U				
		wall diagram		605-03-03
underground substation	605-02-18	wiring (secondary wiring)		605-03-07
unmanned substation	605-01-10	working clearance		605-02-25

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are any reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. ET 01 (3452)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all offices)

Regional Offices :

Telephone

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

{ 331 01 31
{ 331 13 75

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700054

{ 37 84 99, 37 85 61
{ 37 86 26, 37 86 62

Northern : SCO 445-446, Sector 35-C CHANDIGARH 160036

{ 53 38 43, 53 16 40
{ 53 23 84

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113

{ 235 02 16, 235 04 42
{ 235 15 19, 235 23 15

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093

{ 632 92 95, 632 78 58
{ 632 78 91, 632 78 92

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR.
COIMBATORE. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD.
JAIPUR. KANPUR. LUCKNOW. PATNA. THIRUVANANTHAPURAM.